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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/019,965	01/04/2002	Francois Capman	MTR.0028US	6245

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2655	

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/019,965	CAPMAN ET AL.	
	Examiner	Art Unit	
	James S. Wozniak	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/4/2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14-32 and 35-42* is/are rejected.

7)☒ Claim(s) *12,13,33 and 34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *1/4/2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. **Claims 1-42** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-30 of copending Application No. 10/019,789 in view of Jain *(U.S. Patent: 5,189,701)*. Although, the present invention does not claim the inclusion of phase data in coded audio, it would have been obvious

to one of ordinary skill in the art, at the time of invention, to include phase data along with the amplitude data in the encoded audio stream of the present invention in view of Jain. Jain teaches including both amplitude and phase data in a coded audio signal *(Col. 8, Lines 14-43)* for the benefit of more accurately describing a speech signal *(Col. 2, Lines 5-15)*. Therefore, claims 1-42 of the present invention are an obvious variation of Claims 1-30 of application 10/019,789.

This is a provisional obviousness-type double patenting rejection.

Claim Objections

3. **Claims 1-42** are objected to because of the following informalities:

In Claim 1, Lines 7-8 and Claim 22, Line 8, "frequencies multiple' should be changed to --a frequency multiple--.

In Claim 1, Line 13 and Claim 22, Line 15, "the modulus" should be changed to --a modulus-- to provide proper antecedent basis for this limitation.

In Claim 1, Lines 13-14, and Claim 22, Line 16, "in the neighborhood" should be changed to --in a neighborhood-- to provide proper antecedent basis for this limitation.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1-5, 19, 22-26, and 40** are rejected under 35 U.S.C. 102(b) as being anticipated by Jain *(U.S. Patent: 5,189,701)*.

With respect to **Claims 1 and 22**, Jain recites:

Estimating a fundamental frequency of the audio signal *(Col. 3, Lines 62-68)*;

Determining a spectrum of the audio signal through a transform into the frequency domain of a frame of the audio signal (Col. 4, Lines 3-5);

Calculating cepstral coefficients by transforming in the cepstral domain a compressed upper envelope of the spectrum of the audio signal *(compressed higher frequencies, Col. 10, Lines 40-51, logarithmic compression, Col. 9, Lines 50-60, and DCT, Col. 10, Line 52- Col. 11, Line 22);*

Obtaining data representative of spectral amplitudes associated with a frequencies multiple of the fundamental frequency by means of the calculated cepstral coefficients (Col. 11, Lines 40-50); and

Including data for coding a harmonic component of the audio signal, comprising said data representative of the spectral amplitude associated with a frequencies multiple of the fundamental frequency in a digital output stream, wherein the spectral amplitude associated with one of said frequencies multiple of the fundamental frequency is a local maximum of the modulus of the spectrum in the neighborhood of said frequency multiple *(Col. 11, Lines 40-50, and Fig. 13, Element 106)*.

With respect to **Claims 2 and 23**, Jain discloses:

Determining the compressed upper envelope by interpolation of said spectral amplitudes associated with the frequencies multiple of the fundamental frequency, with application of a spectral compression function *(interpolation, Col. 10, Lines 40-51)*.

With respect to **Claims 3 and 24**, Jain discloses:

The interpolation is performed between points each having a frequency multiple of the fundamental frequency as an abscissa and a spectral amplitude, compressed or uncompressed, associated with said multiple frequency as an ordinate *(interpolating utilizing the amplitudes of harmonic data pairs, Col. 10, Lines 40-51)*.

With respect to **Claims 4 and 25**, Jain recites:

The transformation in the cepstral domain of the compressed upper envelope is performed according to a nonlinear frequency scale *(Col. 11, Lines 8-22)*.

With respect to **Claims 5 and 26**, Jain discloses:

Quantizing the cepstral coefficients to form said data representative of the spectral amplitudes associated with the frequencies multiple of the fundamental frequency *(Col. 11, Lines 1-6)*.

With respect to **Claims 19 and 40**, Jain discloses:

The spectrum of the audio signal and the cepstral coefficients resulting from the transformation of the compressed upper envelope are determined for successive mutually overlapping frames of N samples of the audio signal, wherein said data representative of spectral amplitudes associated with the frequencies multiple of the estimated fundamental frequency, obtained by means of the cepstral coefficients calculated by transforming the compressed upper

envelope, are included in the digital output stream for just one subset of the frames *(including amplitude data for an individual sequence of overlapping time frames, Col. 15, Lines 37-48)*.

6. **Claims 6-9 and 27-30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain in view of Hardwick et al *(U.S. Patent: 5,247,579)*.

With respect to **Claims 6 and 27**, Jain teaches the audio coding method and device utilizing harmonic data and cepstral coefficient quantization, as applied to Claim 5. Jain does not teach that the quantization is performed on a prediction residual, however such a method is well known in the audio encoding art, as is evidenced by Hardwick:

The quantization of the cepstral coefficients is performed on a prediction residual for each of the cepstral coefficients *(quantization, Col. 6, Lines 7-8, the specific process of which is disclosed in the prior art and utilizes a set of prediction residuals, Col. 4, Lines 31-55)*.

Jain and Hardwick are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain with the quantization means utilizing a set of prediction residuals as taught by Hardwick to implement an efficient quantization method capable of providing high audio signal fidelity *(Hardwick, Col. 4, Lines 56-62)*.

With respect to **Claims 7 and 28**, Hardwick discloses a method that is functionally equivalent to the equation of the present claim *(Col. 4, Lines 32-55)*.

With respect to **Claims 8 and 29**, Hardwick additionally recites:

Different predictors are used to determine the prediction residuals for at least two of the cepstral coefficients *(set of prediction residuals, Col. 4, Lines 31-55)*.

With respect to **Claims 9 and 30**, Hardwick further discloses:

Distributing the cepstral coefficients into a plurality of cepstral subvectors *(blocks, Col. 4, Lines 31-55)* and quantizing the cepstral subvectors separately by a vector quantization performed on a prediction residual of the cepstral coefficients *(Col. 4, Lines 31-55)*.

7. **Claims 10-11 and 31-32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain in view of Hermansky et al (U.S. Patent: 5,450,522).

With respect to **Claims 10 and 31**, Jain teaches the audio coding method and device in which cepstral processing precedes quantization, as applied to Claim 5. Jain does not teach a means for cepstral coefficient normalization, however Hermansky discloses such a means *(index weighting of cepstral coefficients, Col. 8, Lines 40-48)*.

Jain and Hermansky are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain with the means for cepstral coefficient normalization as taught by Hermansky in order to obtain a more accurate and relative measure of a speech spectrum *(Hermansky, Col. 8, Lines 40-44)*.

With respect to **Claims 11 and 32**, Jain teaches the audio coding method and device in which cepstral processing precedes quantization, as applied to Claim 5. Jain does not teach liftering in the cepstral domain prior to quantization, however Hermansky discloses:

Transforming the cepstral coefficient by liftering in the cepstral domain *(Col. 8, Line 49-Col. 9, Line 4)*.

Jain and Hermansky are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain with the means for liftering in the cepstral domain as taught by Hardwick to implement an additional cepstral processing step utilizing liftering in order to suppress variations in cepstral coefficients for distortion minimization in a speech signal *(Hermansky, Col. 8, Lines 54-56)*.

8. **Claims 14, 17-18, 35, 37-39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain in view of Hermansky et al, and further in view of Hardwick et al.

With respect to **Claims 14 and 35**, Jain in view of Hermansky teaches the audio coding method and device in which cepstral processing, which includes liftering, precedes quantization, as applied to Claim 11. Jain in view of Hermansky does not specifically suggest modulus recalculation and liftering adaptation, however Hardwick discloses:

Recalculating a value of the modulus of the spectrum of the audio signal at at least one frequency multiple of the fundamental frequency on the basis of the transformed and quantized cepstral coefficients *(Col. 7, Line 39- Col. 8, Line 48)*; and

Adapting the liftering so as to minimize a discrepancy in modulus between the spectrum of the audio signal and at least one recalculated modulus value *(adapting filtering in the cepstral domain (liftering), Col. 7, Lines 39-68)*.

Jain, Hermansky, and Hardwick are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain in view of Hermansky with the

means for modulus recalculation and adaptive liftering in order to improve speech intelligibility upon reception at a decoder by enhancing perceptually important speech formants according to the aforementioned method *(Hardwick, Col. 7, Lines 58-68)*.

With respect to **Claims 17 and 38**, Hardwick further recites:

The minimized discrepancy for the adaptation of the liftering relates to at least one frequency multiple of the fundamental frequency, selected on the basis of the magnitude of the modulus of the spectrum in absolute value *(frequency selection for parameter enhancement based upon amplitude, Col. 7, Lines 39-68, also the examiner takes official notice that it would have been obvious to one of ordinary skill in the art, at the time of invention, to utilize an absolute value of the amplitude in order to compensate for a relative amount of amplitude from a perceptible audio level in order to appropriately enhance or decrease frequency components by that amount)*;

With respect to **Claims 18 and 39**, Hardwick additionally recites:

Estimating a curve of spectral masking of the audio signal by means of a psycho-acoustic model, and wherein the minimized discrepancy for the adaptation of the liftering relates to at least one frequency multiple of the fundamental frequency, selected on the basis of the magnitude of the modulus of the spectrum in relation to the masking curve *(selected frequency component for cepstral smoothing adjustment and spectral envelope that considers perceptual importance, Col. 7, Lines 39-68)*.

With respect to ***Claim 37****, Hardwick teaches the means for liftering utilizing a recalculated modulus as applied to Claim 14, while Hermansky teaches the means for liftering according to a minimum phase (Col. 8, Line 49- Col. 9, Line 4).*

9. **Claims 15-16 and 36** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain in view of Hermansky et al, further in view of Hardwick et al, and yet further in view of Tamura et al *(U.S. Patent: 5,715,363)*.

With respect to **Claims 15 and 36**, Jain in view of Hermansky, and further in view of Hardwick teaches the audio coding method and device utilizing cepstral processing, which includes adaptive liftering and audio signal quantization as applied to Claim 14. Hermansky also teaches adapting liftering according to a minimum phase *(Col. 8, Line 49- Col. 9, Line 4)*. Jain in view of Hermansky, and further in view of Hardwick does not specifically suggest an additional step of liftering, however Tamura discloses such a step *(Col. 5, Lines 1-35)*.

Jain, Hermansky, Hardwick, and Tamura are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain in view of Hermansky, and further in view of Hardwick with an additional step of liftering as taught by Tamura to provide a higher quality audio signal representation by utilizing further cepstral coefficient smoothing *(Tamura, Col. 5, Lines 9-10)* after recalculating a modulus value.

With respect to **Claim 16,** Hardwick teaches the means for liftering utilizing a recalculated modulus as applied to Claim 14, while Hermansky teaches the means for liftering according to a minimum phase as applied to Claim 15.

10. **Claims 20-21 and 41-42** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain in view of Chen *(U.S. Patent: 5,710,863)*.

With respect to **Claims 20 and 41**, Jain teaches the audio coding method and device utilizing cepstral processing for a sequence of overlapping frames as applied to Claim 19. Jain does not specifically suggest quantizing an error of interpolation of the cepstral coefficients for data that is not part of the sequence of frames, however Chen teaches a functionally equivalently method for calculating and quantizing an interpolation error for data that is not included in an interpolated data set *(Col. 8, Lines 36-62)*.

Jain and Chen are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain with the means for quantizing an error of interpolation of the cepstral coefficients for data that is not part of the sequence of frames as taught by Chen in order to implement a means of including all elements of an audio signal, including an interpolation error, in order to accurately generate an audio signal at a decoder *(Chen, Col. 14, Lines 1-7)*.

With respect to **Claims 21 and 42**, Chen recites:

Determining an optimal interpolation filter for cepstral coefficients resulting from the transformation of the compressed upper envelope and including related data in a digital output stream for frames which do not form part of a subset *(Col. 8, Lines 36-56)*.

Allowable Subject Matter

11. **Claims 12-13 and 33-34** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

With respect to **Claims 12 and 33**, the prior art of record does not explicitly teach nor fairly suggests the computation for performing the process of transforming cepstral coefficients, prior to quantization, calculated from a compressed upper frequency envelope by liftering in the cepstral domain as recited in Claims 12 and 33 in combination with the speech coding method and system recited in claims 1 and 22.

Claims 13 and 34 further limit the aforementioned claims, and thus would also contain allowable subject matter.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Wilkes et al *(U.S. Patent: 4,058,676)*- teaches a speech coder utilizing cepstral coefficients, pitch frequency, and peak amplitude.
- Ono *(U.S. Patent: 5,583,888)*- teaches a speech coder featuring interpolation error data.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached at (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak
3/9/2006

U. Paul Harper
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